BRITISH Nutrition FOUNDATION

FACTS BEHIND THE HEADLINES

Baby-led weaning

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Several media articles (*e.g. The Guardian*, 17 June 2007; *BBC News online*, 18 June 2007) have recently been published on the idea of 'baby-led weaning', stating that feeding puréed foods to weaning infants is 'unnatural'. They claim that at 6 months, babies should be weaned straight onto solid foods in order to prevent health problems later in life. The argument for such a claim is based on observations by Gill Rapley, Deputy Director of UNICEF's UK Baby Friendly Initiative, who has suggested that at 6 months babies are capable of chewing and controlling their food intake, and the introduction of purée could delay the development of chewing skills, make them prone to constipation and cause them to be fussy eaters. This method of feeding, known as 'baby-led weaning', encourages the infant to feed him/herself with a mixture of hand-held solid foods. There are a few published studies that have investigated baby-led weaning, including notably Rapley's own research (Rapley 2005), which included a very small sample of 5 exclusively breastfed babies who were introduced to solids at 4 months (which, at the time, was considered the earliest age a child could be introduced to solid foods). By 6.5 months, the children were all capable of grasping finger-shaped foods and chewing; most were also beginning to swallow what they chewed. But other research to support baby-led weaning, a diet of solids and no purées for the rapidly developing infant, is very limited.

There is a general consensus that up until the age of 6 months, breastmilk provides all the nutrients a growing infant requires (WHO 2001). However, information regarding weaning and practical information for feeding very young children is less plentiful (Weaver 2007). Weaning is a critical period for child health and, in many countries around the world, there is a sharp rise in the incidence of infection, diarrhoea and malnutrition between the ages of 6–18 months (Daelmans *et al.* 2003). Optimal nutrition is essential for healthy growth and development at this time. Anaemia is a potential risk because exclusive breastmilk diets are not good sources of iron beyond 6 months, and the infant may not be able to produce enough red blood cells and haemoglobin at a time of rapid growth (Poskitt 2003). Iron deficiency at 12 months has been linked to lower scores in fine motor control (Thorsdottir & Gunnarasson 2006); additionally, a lack of vitamin D in breastfed babies from six months can cause rickets (Thompson 2007). These studies emphasise the need for a nutrient-rich diet throughout the weaning period.

Purées and mashed foods have traditionally been the early weaning foods of choice the world over. For example, gruels based on the countries' staple cereals are commonly the infant's first taste in India (Singh *et al.* 2005), Nepal (Moffat 2001) and Senegal (Simondon & Simondon 1995). In the UK, baby rice is the most common first food (Seaman *et al.* 1996). Most weaning guidelines advocate the use of purées before moving on to finger foods and family foods, with minor adaptations (EUNUTNET 2006; DH 2007). Certainly, purées are an obvious transition food to bridge the gap between liquid and solid foods and can provide essential nutrients. At 6 months, most infants can clear a spoon with their upper lip, rather than just sucking the food off. By 8 months, most infants can chew and swallow food with lumps in greater quantities (EUNUTNET 2006). This may mean that if a child is exclusively weaned onto solid foods from 6 months of age, there may be a limit to the amount of food, and therefore nutrients that will actually be swallowed and absorbed. Purées are ideal for being able to introduce a known volume of food to the infant and provide essential nutrients.

However, purées may not supply opportunities for the infant to practice chewing. Studies have shown that infants between the ages of 4 months and 2 years who consume foods that require chewing generally have higher intakes of all macronutrients than those infants who have yet to be introduced to chewable foods (Carruth *et al.* 2004). In fact, it has been suggested that chewing uses muscles that may actually encourage speech development (Rapley 2005; DH 2007), although

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other research does not support this suggestion (Green *et al*. 1997). It is important that lumps are not introduced too late as not only is it likely that an infant will initially reject them, but research has also shown that feeding difficulties and a reduction in food intake variety are more likely if lumps are introduced after 10 months of age (Northstone *et al*. 2001).

Rapley's (2005) baby-led weaning study involved 5 exclusively breastfed infants, and it is possible that breastfed infants are more amenable to baby-led weaning than formula-fed infants. In fact, although not based on empirical research, Rapley (2005) comments that formula-fed infants may be better disposed to consume purées from a spoon as opposed to moving straight on to solid foods, as the sucking from the spoon may be similar to the sucking action required to get milk from a bottle. Previous studies have shown that formula-fed infants are likely to be introduced to weaning foods earlier than breastfed infants, but they are less likely to consume fruit and vegetables when weaning is first initiated (Noble & Emmett 2006). Breastfed infants are generally exposed to a greater range of flavours through breastmilk than formula-fed infants, and this may make them more accepting of new foods and tastes when being weaned (Forestell & Mennella 2007). Following exposure experiments, where infants aged 4–6 months were given salted or unsalted peas or green beans, all infants were seen to significantly increase their intake after the exposure. However, breastfed infants had greater increases in the amount of vegetables consumed after the exposure and a greater level of food intake than formula-fed infants. It is therefore possible that breastfed infants are more accepting of solid foods in general, compared with formula-fed infants (Sullivan & Birch 1994).

Young children tackle new and novel foods naturally 'with a mixture of neophilia and neophobia' (Cooke 2007), despite being initially interested in a new food they may be reluctant to taste it. Neophobia is a common infant response to a new food, suggesting that it is an innate safety mechanism and children should not be labelled as fussy eaters as a result of initially rejecting new foods (Birch 1998). Evidence shows that repeated exposure to a variety of tastes and flavours can reduce neophobia and increase the acceptance of new foods (Sullivan & Birch 1994). This highlights the need to repeatedly introduce healthy foods early on in life. This has been further illustrated by Emmett *et al*. (2007), who found that fruit and vegetable consumption at age 7 years was positively correlated with home-cooked foods and the number of portions of raw fruit and vegetables consumed at 6 months of age, whereas shop-bought ready-prepared fruits and vegetables (which often contain mixtures of different kinds of fruit and vegetables) were negatively correlated with intake at this stage.

Similarly, in a study of children aged 2–6 years living in North London, fruit consumption was related to early feeding experiences, including breastfeeding and the early presentation of fruit and vegetables at weaning, emphasising that the early introduction of a varied and healthy diet is important in establishing good eating habits throughout childhood (Cooke *et al*. 2004). Exposure to a variety of fruit and vegetables can also facilitate the acceptance of novel foods. In an experiment in which infants were fed either carrots or a variety of vegetables, those who ate the variety were more likely to accept a novel food such as puréed chicken. In addition, the infants who received a varied diet, compared with a limited monotonous one, had a greater energy and nutrient intake (Gerrish & Mennella 2001). Clearly, the types of foods introduced during the weaning period can be important determinants of dietary variety and the acceptance of novel foods consumed later in childhood and even adulthood (Gibson *et al*. 1998). If baby-led weaning places emphasis on exploring taste and texture, then this could be an important way of introducing a greater variety of foods.

As with breastfeeding on demand, baby-led weaning effectively gives control to the infant, whereas with the spoon-feeding of purées, the carer has control. It has been suggested that spoon-feeding has the potential to result in overfeeding (Akre 1991), but any parent who has witnessed headshaking, a clamped shut mouth or the spitting out of food, signalling when the infant has consumed enough, may believe this to be unlikely. Controlling feeding styles may make some children unable to self-regulate their intakes, and this has been linked to childhood obesity (Sacco *et al*. 2007). Restrictive feeding strategies, in particular, seem to be positively associated with increased energy intake and bodyweight (Faith *et al*. 2004), although some of the studies investigating this link have included older children. Further work in this area is still required.

In conclusion, to claim that the consumption of purées is not natural and all babies should be weaned straight onto solid foods is potentially misleading, as it is a diet that contains both purées and solid finger foods that is the most likely to provide the variety of foods and nutrients that a developing infant requires. To date, there has been very little research to support baby-led weaning and, until there is more evidence, it is difficult to draw any firm conclusions about the potential benefits or problems it may offer. Studies have shown that

children who, from 6 months onwards, have lots of opportunities to eat a mixture of foods, have the greatest nutrient intakes and healthiest diets throughout childhood and into adulthood (Cooke 2007). Therefore, it is likely to be the presentation of a variety of foods with different textures and flavours that the child can explore that is important, rather than a focus on purées versus solid foods per se.

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